

FCC Test Report (BT-LE)

Report No.: RF190628E01-3

FCC ID: RAS-MT7663

Test Model: MT7663

Received Date: June 28, 2019

Test Date: Sep. 05 to 10, 2019

Issued Date: Dec. 31, 2019

Applicant: MediaTek Inc.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Hsin Chu Laboratory

Lab Address: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan

Test Location: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan

**FCC Registration /
Designation Number:** 723255 / TW2022



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Release Control Record

Issue No.	Description	Date Issued
RF190628E01-3	Original release.	Dec. 31, 2019

1 Certificate of Conformity

Product: 2TX 11ac + BLE Combo Card

Brand: MTK

Test Model: MT7663

Sample Status: ENGINEERING SAMPLE

Applicant: MediaTek Inc.

Test Date: Sep. 05 to 10, 2019

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10: 2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Joyce Kuo , **Date:** Dec. 31, 2019
Joyce Kuo / Specialist

Approved by : Clark Lin , **Date:** Dec. 31, 2019
Clark Lin / Technical Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -16.22dB at 0.15391 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -3.5dB at 33.37MHz
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is i-pex(MHF), R-SMA not a standard connector.

Note:

Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) ($\pm$)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.8 dB
Conducted Emissions	-	3.1 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.0 dB
	30MHz ~ 1GHz	5.1 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.1 dB
	6GHz ~ 18GHz	5.0 dB
	18GHz ~ 40GHz	5.2 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT (BT-LE)

Product	2TX 11ac + BLE Combo Card
Brand	MTK
Test Model	MT7663
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 3.3V from host equipment
Modulation Type	GFSK
Modulation Technology	DTS
Transfer Rate	BT_LE: Up to 2Mbps
Operating Frequency	BT_LE: 2402MHz ~ 2480MHz
Number of Channel	BT_LE: 40
Output Power	BT_LE 1M: 6.808mW BT_LE 2M: 7.311mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. There are WLAN, BT technology used for the EUT.
2. The EUT has two interfaces. The main difference is interface, but RF is the same. Please refer to the following table:

Interface	Difference
PCIe	PCIe and SDIO interface signal switch by IC bonding on the same pin, Most of the layout including RF, PMU, and the control signal is the same.
SDIO	

From the above Interface, the worst case was found in PCIe interface. Therefore only the test data of the modes were recorded in this report.

3. Simultaneously transmission condition.

Condition	Technology	
1	WLAN 2.4GHz	Bluetooth
2	WLAN 5GHz	Bluetooth

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

4. The antennas provided to the EUT, please refer to the following table:

Antenna Set	RF Chain No.	Brand	Model	Ant. Net Gain (dBi)	Frequency range (GHz)	Antenna Type	Connector Type	Cable Length
1	Chain 0	LYNwave	ALA110-222050-300011	3.5	2.4~2.4835	PIFA	i-pex(MHF)	55mm
				5	5.15~5.85			
	Chain 1	LYNwave	ALA110-222050-300011	3.5	2.4~2.4835	PIFA	i-pex(MHF)	55mm
				5	5.15~5.85			
2	Chain 0	Cortec	AN2450-4902BRS	2.42	2.4~2.4835	Dipole	R-SMA	150mm
				3.87	5.15~5.85			
	Chain 1	Cortec	AN2450-4902BRS	2.42	2.4~2.4835	Dipole	R-SMA	150mm
				3.87	5.15~5.85			
3	Chain 0	PSA	RFMTA340718EMLB301	2.92	2.4~2.4835	PIFA	i-pex(MHF)	199.4mm
				4.94	5.15~5.85			
	Chain 1	PSA	RFMTA340718EMLB301	2.92	2.4~2.4835	PIFA	i-pex(MHF)	199.4mm
				4.94	5.15~5.85			

Note: The Max. gain was selected for Radiated Emission Measurement test.

5. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

40 channels are provided to this EUT:

CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE $\geq$ 1G	RE<1G	PLC	APCM	
1	√	√	√	√	PIFA antenna
2	√	√	-	-	Dipole antenna

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz & Bandedge Measurement **RE<1G**: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

NOTE: The EUT's antenna (PIFA) had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on Y-plane (below 1GHz) & Z-plane (above 1GHz).

Radiated Emission Test (Above 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
0 to 39	0, 19, 39	GFSK	1
1 to 38	1, 19, 38	GFSK	2

Radiated Emission Test (Below 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
0 to 39	0	GFSK	1

Power Line Conducted Emission Test:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
0 to 39	0	GFSK	1

Antenna Port Conducted Measurement:

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
0 to 39	0, 19, 39	GFSK	1
1 to 38	1, 19, 38	GFSK	2

Test Condition:

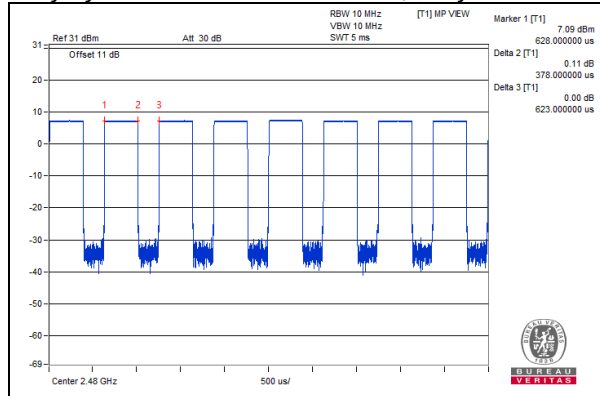
APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (System)	TESTED BY
RE $\geq$ 1G	24deg. C, 65%RH	120Vac, 60Hz	Nelson Teng Tank Wu
RE<1G	22deg. C, 67%RH	120Vac, 60Hz	Ryan Du
PLC	24deg. C, 75%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

3.3 Duty Cycle of Test Signal

If duty cycle of test signal is < 98%, duty factor shall be considered.

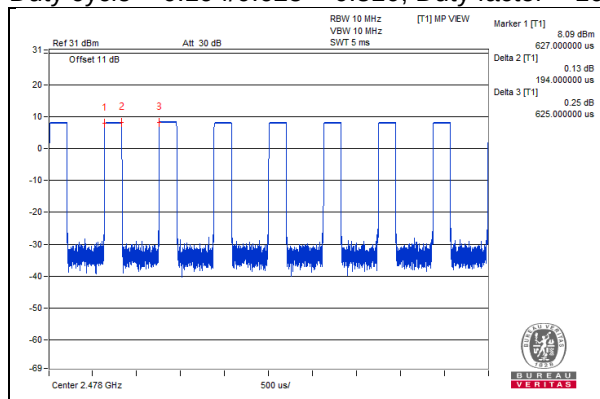
BT_LE 1M

Duty cycle = $0.378/0.623 = 0.607$, Duty factor = $10 * \log(1/\text{Duty factor}) = 2.17$



BT_LE 2M

Duty cycle = $0.194/0.625 = 0.310$, Duty factor = $10 * \log(1/\text{Duty factor}) = 5.08$



3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	DELL	E5430	GM1SKV1	FCC DoC	Provided by Lab
B.	Test Tool	MTK	NA	NA	NA	Supplied by client
C.	Adapter	DELL	DA90PM111	NA	NA	Provided by Lab
D.	Laptop	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab (For Conduction)

Note:

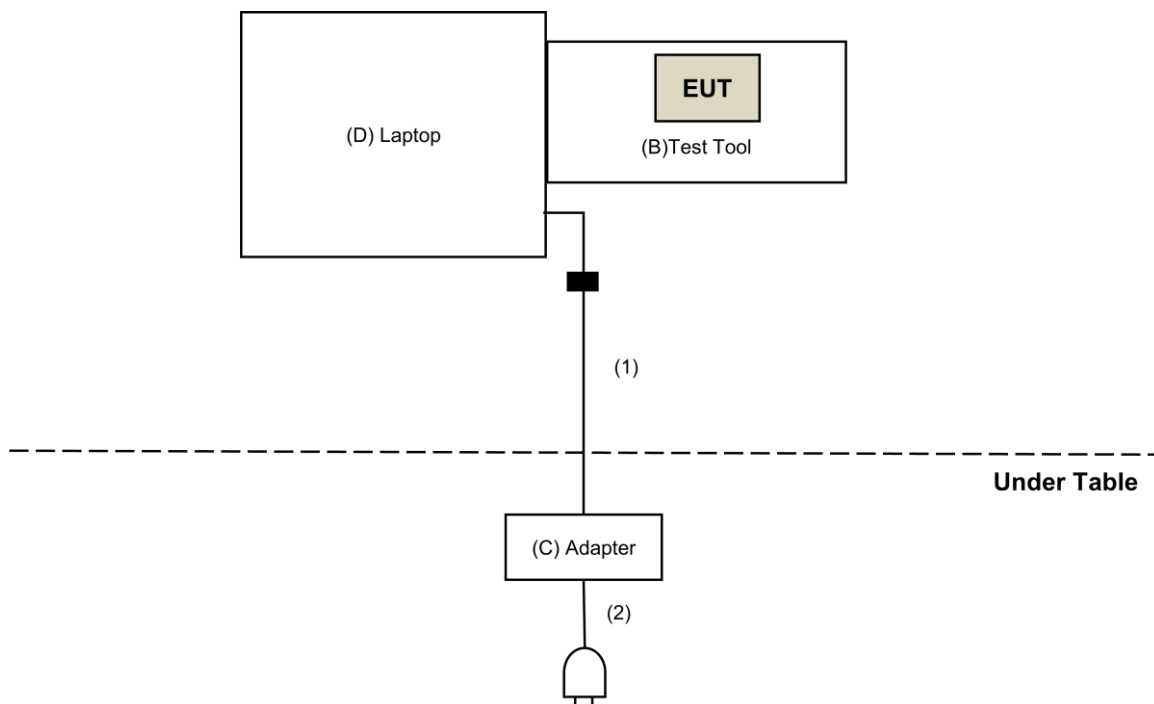
1. All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC Cable	1	1.8	No	1	Provided by Lab
2.	AC Cable	1	0.9	No	0	Provided by Lab

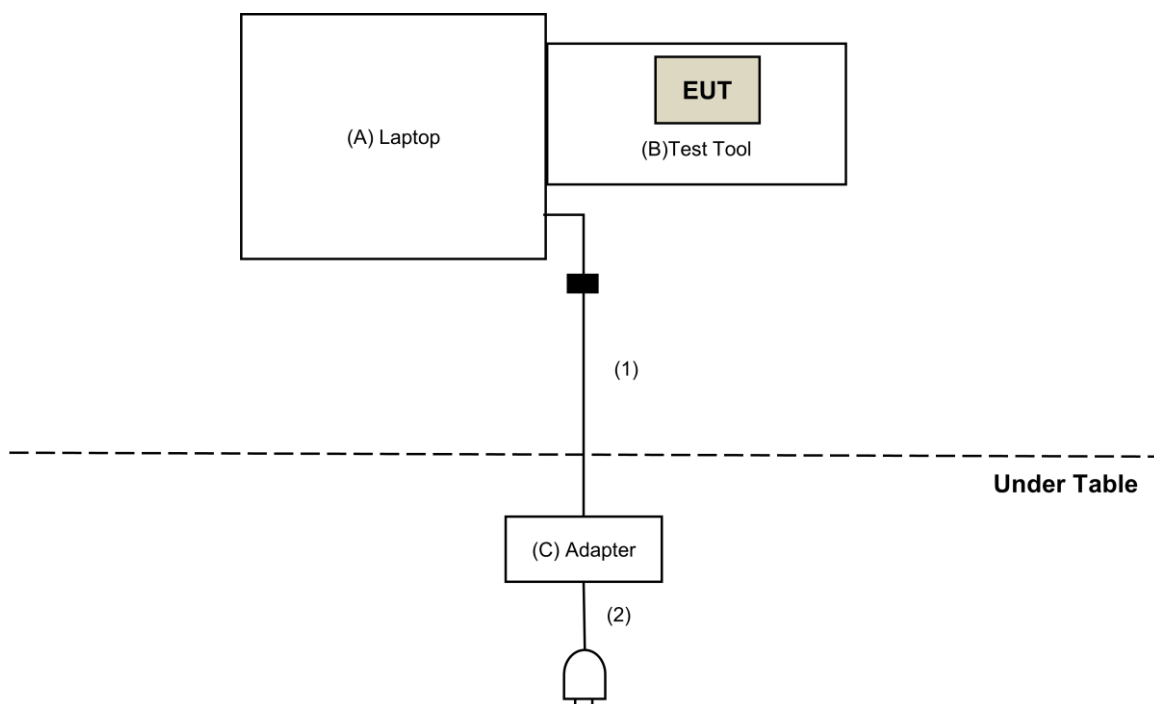
Note: The core(s) is(are) originally attached to the cable(s).

3.4.1 Configuration of System under Test

For Conducted Emissions test:



For other test:



3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.247)
KDB 558074 D01 15.247 Meas Guidance v05r02
ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	July 17, 2019	July 16, 2020
Pre-Amplifier EMCI	EMC001340	980142	May 30, 2019	May 29, 2020
Loop Antenna Electro-Metrics	EM-6879	264	Jan. 22, 2019	Jan. 21, 2020
RF Cable	NA	LOOPCAB-001	Jan. 14, 2019	Jan. 13, 2020
RF Cable	NA	LOOPCAB-002	Jan. 14, 2019	Jan. 13, 2020
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	Apr. 30, 2019	Apr. 29, 2020
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Nov. 22, 2018	Nov. 21, 2019
RF Cable	8D	966-3-1	Mar. 18, 2019	Mar. 17, 2020
RF Cable	8D	966-3-2	Mar. 18, 2019	Mar. 17, 2020
RF Cable	8D	966-3-3	Mar. 18, 2019	Mar. 17, 2020
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Sep. 27, 2018	Sep. 26, 2019
Horn Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Nov. 25, 2018	Nov. 24, 2019
Pre-Amplifier EMCI	EMC12630SE	980384	Jan. 28, 2019	Jan. 27, 2020
RF Cable	EMC104-SM-SM-1200	160922	Jan. 28, 2019	Jan. 27, 2020
RF Cable	EMC104-SM-SM-2000	180601	June 10, 2019	June 09, 2020
RF Cable	EMC104-SM-SM-6000	180602	June 10, 2019	June 09, 2020
Spectrum Analyzer Keysight	N9030A	MY54490679	July 17, 2019	July 16, 2020
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 28, 2019	Jan. 27, 2020
Horn Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 25, 2018	Nov. 24, 2019
RF Cable	EMC102-KM-KM-1200	160924	Jan. 28, 2019	Jan. 27, 2020
RF Cable	EMC102-KM-KM-1200	160925	Jan. 28, 2019	Jan. 27, 2020
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Spectrum Analyzer R&S	FSV40	100964	June 04, 2019	June 03, 2020
Power meter Anritsu	ML2495A	1014008	May 13, 2019	May 12, 2020
Power sensor Anritsu	MA2411B	0917122	May 13, 2019	May 12, 2020
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 15, 2019	Apr. 14, 2020

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 3.
3. Loop antenna was used for all emissions below 30 MHz.
4. Tested Date: Sep. 05 to 10, 2019

4.1.3 Test Procedures

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

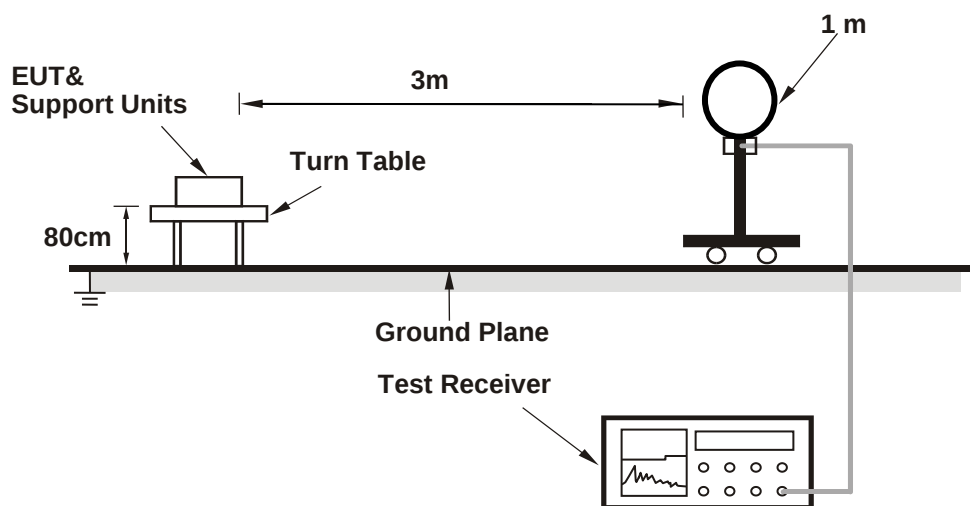
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle $< 98\%$) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

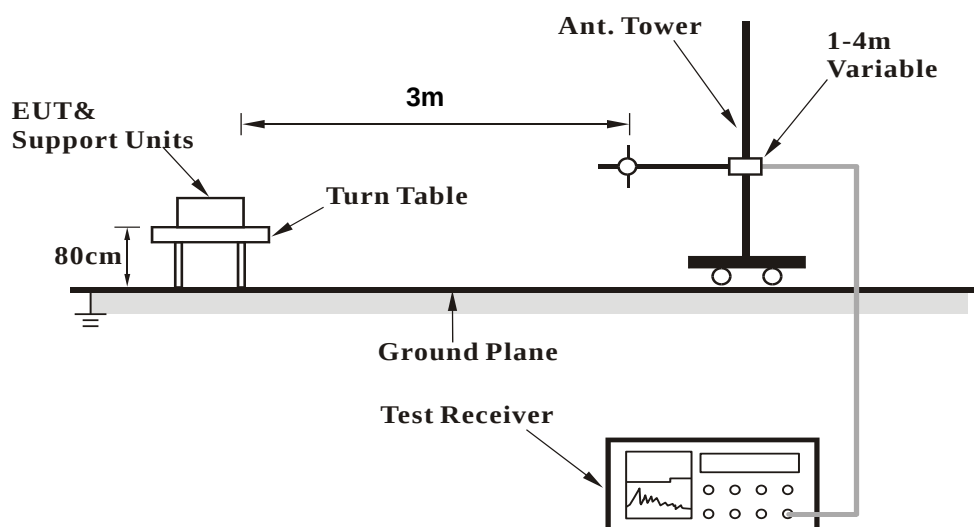
No deviation.

4.1.5 Test Setup

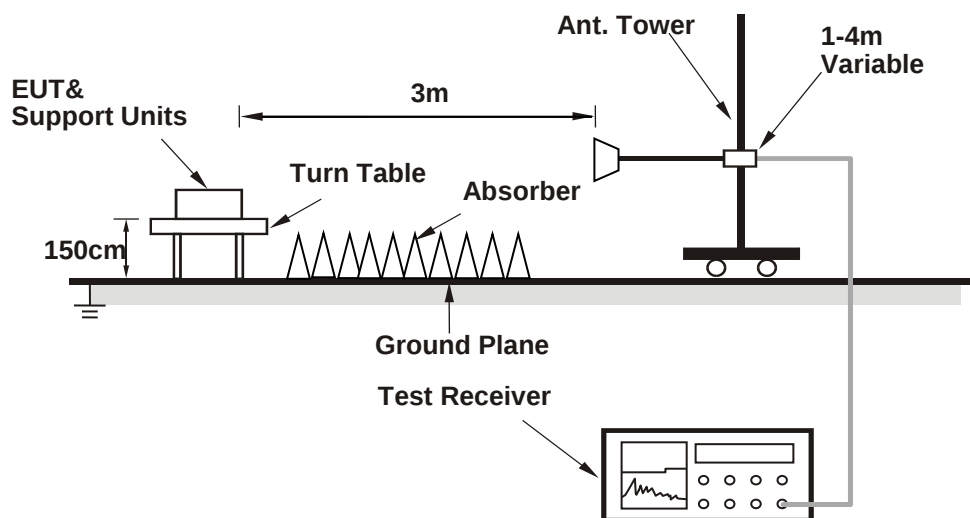
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

- Connected the EUT with the Laptop which is placed on the testing table.
- Controlling software (WCN Combo Tool) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results (Mode 1)

BT_LE 1M

Above 1GHz Data:

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	58.1 PK	74.0	-15.9	1.04 H	19	60.1	-2.0
2	2390.00	47.1 AV	54.0	-6.9	1.04 H	19	49.1	-2.0
3	*2402.00	104.8 PK			1.04 H	19	106.8	-2.0
4	*2402.00	103.5 AV			1.04 H	19	105.5	-2.0
5	4804.00	40.1 PK	74.0	-33.9	1.48 H	131	37.8	2.3
6	4804.00	30.8 AV	54.0	-23.2	1.48 H	131	28.5	2.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	58.3 PK	74.0	-15.7	1.28 V	153	60.3	-2.0
2	2390.00	46.9 AV	54.0	-7.1	1.28 V	153	48.9	-2.0
3	*2402.00	99.9 PK			1.28 V	153	101.9	-2.0
4	*2402.00	98.4 AV			1.28 V	153	100.4	-2.0
5	4804.00	40.0 PK	74.0	-34.0	1.72 V	138	37.7	2.3
6	4804.00	30.8 AV	54.0	-23.2	1.72 V	138	28.5	2.3

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 19	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2440.00	103.9 PK			1.00 H	21	106.0	-2.1
2	*2440.00	103.1 AV			1.00 H	21	105.2	-2.1
3	4880.00	40.3 PK	74.0	-33.7	1.49 H	117	38.0	2.3
4	4880.00	31.1 AV	54.0	-22.9	1.49 H	117	28.8	2.3
5	7320.00	44.3 PK	74.0	-29.7	1.56 H	103	36.1	8.2
6	7320.00	33.8 AV	54.0	-20.2	1.56 H	103	25.6	8.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2440.00	100.2 PK			1.00 V	97	102.3	-2.1
2	*2440.00	98.6 AV			1.00 V	97	100.7	-2.1
3	4880.00	39.8 PK	74.0	-34.2	1.71 V	133	37.5	2.3
4	4880.00	30.8 AV	54.0	-23.2	1.71 V	133	28.5	2.3
5	7320.00	44.1 PK	74.0	-29.9	1.23 V	144	35.9	8.2
6	7320.00	33.5 AV	54.0	-20.5	1.23 V	144	25.3	8.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	104.9 PK			1.13 H	20	107.1	-2.2
2	*2480.00	103.4 AV			1.13 H	20	105.6	-2.2
3	2483.50	59.1 PK	74.0	-14.9	1.13 H	20	61.3	-2.2
4	2483.50	47.1 AV	54.0	-6.9	1.13 H	20	49.3	-2.2
5	4960.00	40.9 PK	74.0	-33.1	1.47 H	128	38.4	2.5
6	4960.00	31.5 AV	54.0	-22.5	1.47 H	128	29.0	2.5
7	7440.00	44.7 PK	74.0	-29.3	1.54 H	106	36.3	8.4
8	7440.00	34.1 AV	54.0	-19.9	1.54 H	106	25.7	8.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	99.6 PK			1.04 V	87	101.8	-2.2
2	*2480.00	98.2 AV			1.04 V	87	100.4	-2.2
3	2483.50	57.7 PK	74.0	-16.3	1.04 V	87	59.9	-2.2
4	2483.50	46.8 AV	54.0	-7.2	1.04 V	87	49.0	-2.2
5	4960.00	40.9 PK	74.0	-33.1	1.73 V	143	38.4	2.5
6	4960.00	30.9 AV	54.0	-23.1	1.73 V	143	28.4	2.5
7	7440.00	43.5 PK	74.0	-30.5	1.27 V	158	35.1	8.4
8	7440.00	33.2 AV	54.0	-20.8	1.27 V	158	24.8	8.4

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

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Above 1GHz Data:

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	55.8 PK	74.0	-18.2	1.42 H	15	57.8	-2.0
2	2390.00	44.3 AV	54.0	-9.7	1.42 H	15	46.3	-2.0
3	*2404.00	103.3 PK			1.42 H	15	105.3	-2.0
4	*2404.00	101.1 AV			1.42 H	15	103.1	-2.0
5	4808.00	39.7 PK	74.0	-34.3	1.60 H	103	37.4	2.3
6	4808.00	29.7 AV	54.0	-24.3	1.60 H	103	27.4	2.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	55.5 PK	74.0	-18.5	3.82 V	240	57.5	-2.0
2	2390.00	44.1 AV	54.0	-9.9	3.82 V	240	46.1	-2.0
3	*2404.00	100.7 PK			3.82 V	240	102.7	-2.0
4	*2404.00	98.6 AV			3.82 V	240	100.6	-2.0
5	4808.00	38.2 PK	74.0	-35.8	1.76 V	180	35.9	2.3
6	4808.00	28.9 AV	54.0	-25.1	1.76 V	180	26.6	2.3

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 19	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2440.00	102.8 PK			1.22 H	24	104.9	-2.1
2	*2440.00	100.4 AV			1.22 H	24	102.5	-2.1
3	4880.00	40.2 PK	74.0	-33.8	1.64 H	94	37.9	2.3
4	4880.00	29.9 AV	54.0	-24.1	1.64 H	94	27.6	2.3
5	7320.00	42.9 PK	74.0	-31.1	1.63 H	119	34.7	8.2
6	7320.00	32.2 AV	54.0	-21.8	1.63 H	119	24.0	8.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2440.00	99.2 PK			3.78 V	233	101.3	-2.1
2	*2440.00	96.9 AV			3.78 V	233	99.0	-2.1
3	4880.00	38.4 PK	74.0	-35.6	1.81 V	173	36.1	2.3
4	4880.00	29.3 AV	54.0	-24.7	1.81 V	173	27.0	2.3
5	7320.00	42.2 PK	74.0	-31.8	1.84 V	193	34.0	8.2
6	7320.00	31.8 AV	54.0	-22.2	1.84 V	193	23.6	8.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 38	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2478.00	102.9 PK			1.12 H	19	105.1	-2.2
2	*2478.00	100.6 AV			1.12 H	19	102.8	-2.2
3	2483.50	57.1 PK	74.0	-16.9	1.12 H	19	59.3	-2.2
4	2483.50	46.9 AV	54.0	-7.1	1.12 H	19	49.1	-2.2
5	4956.00	40.1 PK	74.0	-33.9	1.59 H	102	37.6	2.5
6	4956.00	29.7 AV	54.0	-24.3	1.59 H	102	27.2	2.5
7	7434.00	43.2 PK	74.0	-30.8	1.63 H	117	34.8	8.4
8	7434.00	32.4 AV	54.0	-21.6	1.63 H	117	24.0	8.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2478.00	101.2 PK			3.99 V	243	103.4	-2.2
2	*2478.00	98.9 AV			3.99 V	243	101.1	-2.2
3	2483.50	55.4 PK	74.0	-18.6	3.99 V	243	57.6	-2.2
4	2483.50	44.1 AV	54.0	-9.9	3.99 V	243	46.3	-2.2
5	4956.00	38.3 PK	74.0	-35.7	1.79 V	167	35.8	2.5
6	4956.00	29.4 AV	54.0	-24.6	1.79 V	167	26.9	2.5
7	7434.00	42.5 PK	74.0	-31.5	1.84 V	205	34.1	8.4
8	7434.00	31.9 AV	54.0	-22.1	1.84 V	205	23.5	8.4

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

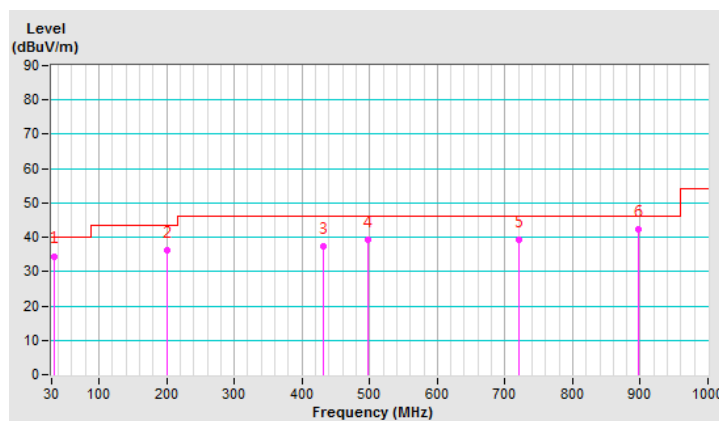
Below 1GHz Data:

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	32.93	34.5 QP	40.0	-5.5	1.00 H	63	44.0	-9.5
2	199.98	36.1 QP	43.5	-7.4	1.50 H	155	46.2	-10.1
3	432.12	37.4 QP	46.0	-8.6	2.00 H	77	40.6	-3.2
4	498.00	39.2 QP	46.0	-6.8	1.50 H	66	40.7	-1.5
5	720.08	39.3 QP	46.0	-6.7	1.50 H	49	36.9	2.4
6	896.35	42.3 QP	46.0	-3.7	1.00 H	165	36.6	5.7

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

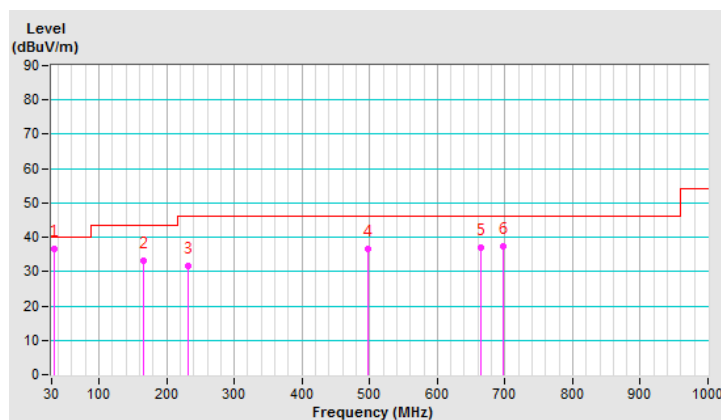


CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	33.37	36.5 QP	40.0	-3.5	1.00 V	87	45.9	-9.4
2	166.01	33.0 QP	43.5	-10.5	1.00 V	271	41.4	-8.4
3	232.10	31.5 QP	46.0	-14.5	1.50 V	156	40.7	-9.2
4	497.93	36.7 QP	46.0	-9.3	1.50 V	276	38.2	-1.5
5	663.65	37.1 QP	46.0	-8.9	1.00 V	152	35.3	1.8
6	698.13	37.3 QP	46.0	-8.7	1.00 V	211	34.9	2.4

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



4.1.8 Test Results (Mode 2)

BT_LE 1M

Above 1GHz Data:

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	58.9 PK	74.0	-15.1	1.34 H	139	60.9	-2.0
2	2390.00	47.2 AV	54.0	-6.8	1.34 H	139	49.2	-2.0
3	*2402.00	99.3 PK			1.34 H	139	101.3	-2.0
4	*2402.00	98.1 AV			1.34 H	139	100.1	-2.0
5	4804.00	40.1 PK	74.0	-33.9	1.69 H	141	37.8	2.3
6	4804.00	30.8 AV	54.0	-23.2	1.69 H	141	28.5	2.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	58.3 PK	74.0	-15.7	1.03 V	13	60.3	-2.0
2	2390.00	47.6 AV	54.0	-6.4	1.03 V	13	49.6	-2.0
3	*2402.00	103.6 PK			1.03 V	13	105.6	-2.0
4	*2402.00	102.8 AV			1.03 V	13	104.8	-2.0
5	4804.00	39.8 PK	74.0	-34.2	1.67 V	152	37.5	2.3
6	4804.00	30.8 AV	54.0	-23.2	1.67 V	152	28.5	2.3

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 19	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2440.00	99.8 PK			1.29 H	124	101.9	-2.1
2	*2440.00	98.3 AV			1.29 H	124	100.4	-2.1
3	4880.00	40.3 PK	74.0	-33.7	1.54 H	103	38.0	2.3
4	4880.00	31.1 AV	54.0	-22.9	1.54 H	103	28.8	2.3
5	7320.00	44.3 PK	74.0	-29.7	1.55 H	106	36.1	8.2
6	7320.00	34.0 AV	54.0	-20.0	1.55 H	106	25.8	8.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2440.00	103.2 PK			1.07 V	9	105.3	-2.1
2	*2440.00	102.3 AV			1.07 V	9	104.4	-2.1
3	4880.00	40.1 PK	74.0	-33.9	1.72 V	148	37.8	2.3
4	4880.00	31.0 AV	54.0	-23.0	1.72 V	148	28.7	2.3
5	7320.00	43.8 PK	74.0	-30.2	1.22 V	151	35.6	8.2
6	7320.00	33.2 AV	54.0	-20.8	1.22 V	151	25.0	8.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	99.7 PK			1.39 H	139	101.9	-2.2
2	*2480.00	98.3 AV			1.39 H	139	100.5	-2.2
3	2483.50	57.9 PK	74.0	-16.1	1.39 H	139	60.1	-2.2
4	2483.50	47.1 AV	54.0	-6.9	1.39 H	139	49.3	-2.2
5	4960.00	40.8 PK	74.0	-33.2	1.50 H	136	38.3	2.5
6	4960.00	31.5 AV	54.0	-22.5	1.50 H	136	29.0	2.5
7	7440.00	44.3 PK	74.0	-29.7	1.57 H	106	35.9	8.4
8	7440.00	33.9 AV	54.0	-20.1	1.57 H	106	25.5	8.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	104.0 PK			1.04 V	22	106.2	-2.2
2	*2480.00	102.9 AV			1.04 V	22	105.1	-2.2
3	2483.50	58.8 PK	74.0	-15.2	1.04 V	22	61.0	-2.2
4	2483.50	46.8 AV	54.0	-7.2	1.04 V	22	49.0	-2.2
5	4960.00	41.6 PK	74.0	-32.4	1.67 V	128	39.1	2.5
6	4960.00	31.3 AV	54.0	-22.7	1.67 V	128	28.8	2.5
7	7440.00	43.7 PK	74.0	-30.3	1.31 V	151	35.3	8.4
8	7440.00	33.3 AV	54.0	-20.7	1.31 V	151	24.9	8.4

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

BT_LE 2M
Above 1GHz Data:

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	58.7 PK	74.0	-15.3	1.34 H	125	60.7	-2.0
2	2390.00	47.3 AV	54.0	-6.7	1.34 H	125	49.3	-2.0
3	*2404.00	99.5 PK			1.34 H	125	101.5	-2.0
4	*2404.00	98.3 AV			1.34 H	125	100.3	-2.0
5	4808.00	40.1 PK	74.0	-33.9	1.73 H	133	37.8	2.3
6	4808.00	30.9 AV	54.0	-23.1	1.73 H	133	28.6	2.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	58.9 PK	74.0	-15.1	1.02 V	7	60.9	-2.0
2	2390.00	48.0 AV	54.0	-6.0	1.02 V	7	50.0	-2.0
3	*2404.00	104.0 PK			1.02 V	7	106.0	-2.0
4	*2404.00	103.0 AV			1.02 V	7	105.0	-2.0
5	4808.00	39.6 PK	74.0	-34.4	1.67 V	144	37.3	2.3
6	4808.00	30.8 AV	54.0	-23.2	1.67 V	144	28.5	2.3

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 19	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2440.00	100.2 PK			1.34 H	112	102.3	-2.1
2	*2440.00	98.7 AV			1.34 H	112	100.8	-2.1
3	4880.00	40.6 PK	74.0	-33.4	1.54 H	113	38.3	2.3
4	4880.00	31.5 AV	54.0	-22.5	1.54 H	113	29.2	2.3
5	7320.00	44.7 PK	74.0	-29.3	1.50 H	109	36.5	8.2
6	7320.00	34.5 AV	54.0	-19.5	1.50 H	109	26.3	8.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2440.00	103.0 PK			1.12 V	1	105.1	-2.1
2	*2440.00	102.3 AV			1.12 V	1	104.4	-2.1
3	4880.00	40.7 PK	74.0	-33.3	1.74 V	133	38.4	2.3
4	4880.00	31.3 AV	54.0	-22.7	1.74 V	133	29.0	2.3
5	7320.00	44.2 PK	74.0	-29.8	1.18 V	167	36.0	8.2
6	7320.00	33.4 AV	54.0	-20.6	1.18 V	167	25.2	8.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 38	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2478.00	99.6 PK			1.35 H	154	101.8	-2.2
2	*2478.00	98.0 AV			1.35 H	154	100.2	-2.2
3	2483.50	58.0 PK	74.0	-16.0	1.35 H	154	60.2	-2.2
4	2483.50	47.0 AV	54.0	-7.0	1.35 H	154	49.2	-2.2
5	4956.00	40.2 PK	74.0	-33.8	1.49 H	133	37.7	2.5
6	4956.00	31.1 AV	54.0	-22.9	1.49 H	133	28.6	2.5
7	7434.00	44.6 PK	74.0	-29.4	1.61 H	100	36.2	8.4
8	7434.00	34.3 AV	54.0	-19.7	1.61 H	100	25.9	8.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2478.00	103.4 PK			1.04 V	30	105.6	-2.2
2	*2478.00	102.5 AV			1.04 V	30	104.7	-2.2
3	2483.50	58.7 PK	74.0	-15.3	1.04 V	30	60.9	-2.2
4	2483.50	46.5 AV	54.0	-7.5	1.04 V	30	48.7	-2.2
5	4956.00	42.1 PK	74.0	-31.9	1.71 V	126	39.6	2.5
6	4956.00	31.8 AV	54.0	-22.2	1.71 V	126	29.3	2.5
7	7434.00	43.7 PK	74.0	-30.3	1.33 V	135	35.3	8.4
8	7434.00	33.4 AV	54.0	-20.6	1.33 V	135	25.0	8.4

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

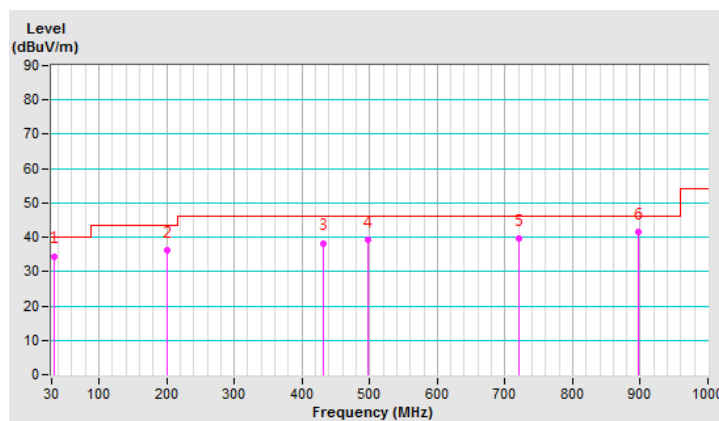
Below 1GHz Data:

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	33.08	34.5 QP	40.0	-5.5	1.00 H	68	44.0	-9.5
2	200.01	36.2 QP	43.5	-7.3	1.50 H	133	46.3	-10.1
3	432.51	38.3 QP	46.0	-7.7	2.00 H	84	41.5	-3.2
4	498.16	39.3 QP	46.0	-6.7	1.50 H	88	40.8	-1.5
5	720.02	39.7 QP	46.0	-6.3	1.50 H	49	37.3	2.4
6	896.37	41.7 QP	46.0	-4.3	1.50 H	46	36.0	5.7

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

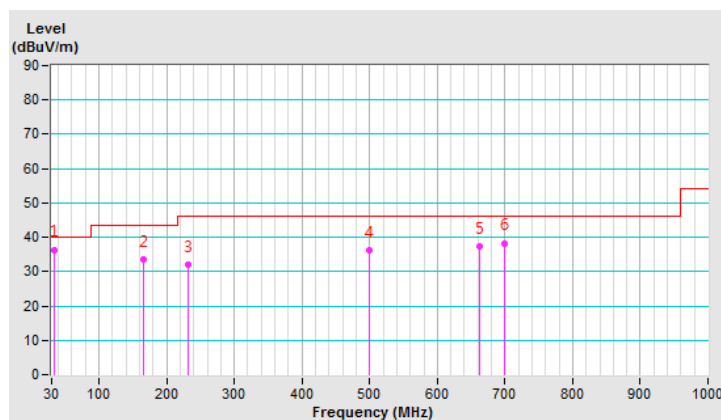


CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	33.74	36.4 QP	40.0	-3.6	1.50 V	172	45.7	-9.3
2	165.11	33.5 QP	43.5	-10.0	1.50 V	221	42.0	-8.5
3	231.60	32.1 QP	46.0	-13.9	1.50 V	251	41.4	-9.3
4	498.87	36.1 QP	46.0	-9.9	1.50 V	192	37.5	-1.4
5	663.00	37.3 QP	46.0	-8.7	1.00 V	203	35.5	1.8
6	698.61	38.3 QP	46.0	-7.7	1.50 V	156	35.9	2.4

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 24, 2018	Oct. 23, 2019
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 22, 2018	Oct. 21, 2019
Line-Impedance Stabilization Network (for Peripheral) R&S	ESH3-Z5	835239/001	Mar. 17, 2019	Mar. 16, 2020
50 ohms Terminator	N/A	3	Oct. 22, 2018	Oct. 21, 2019
RF Cable	5D-FB	COCCAB-001	Sep. 28, 2018	Sep. 27, 2019
Fixed attenuator EMCI	STI02-2200-10	003	Mar. 14, 2019	Mar. 13, 2020
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Conduction 1.
- 3 Tested Date: Sep. 10, 2019

4.2.3 Test Procedures

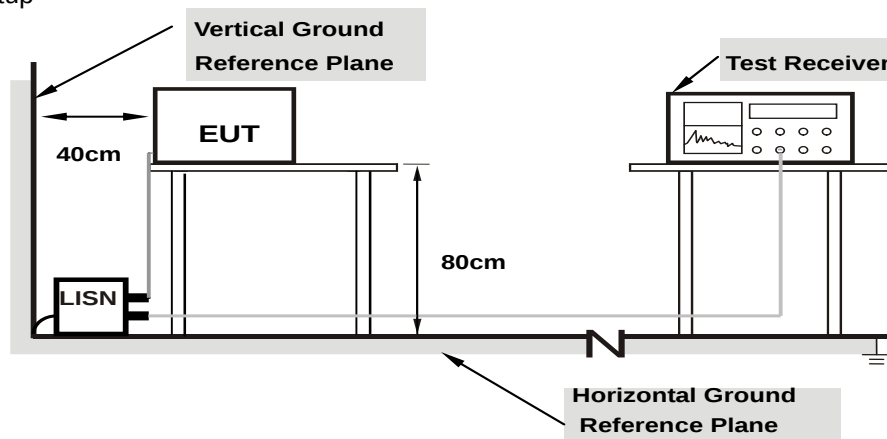
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT Operating Conditions

Same as 4.1.6.

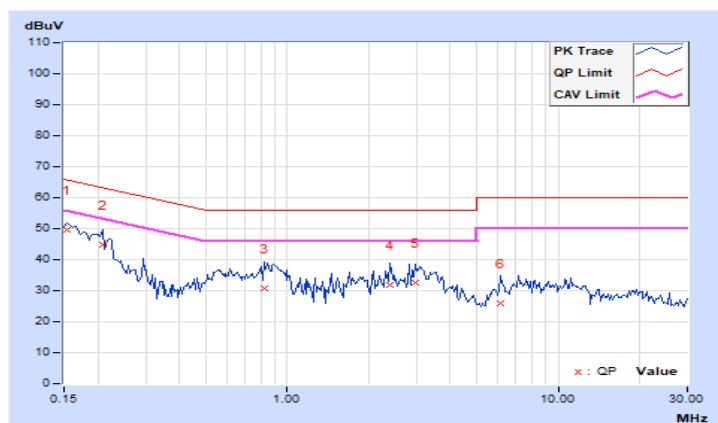
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	9.95	39.62	18.90	49.57	28.85	65.79	55.79	-16.22	-26.94
2	0.20859	9.96	34.75	20.43	44.71	30.39	63.26	53.26	-18.55	-22.87
3	0.82188	10.00	20.87	7.94	30.87	17.94	56.00	46.00	-25.13	-28.06
4	2.39453	10.09	21.79	13.83	31.88	23.92	56.00	46.00	-24.12	-22.08
5	2.97266	10.12	22.44	15.69	32.56	25.81	56.00	46.00	-23.44	-20.19
6	6.14453	10.28	15.62	9.65	25.90	19.93	60.00	50.00	-34.10	-30.07

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

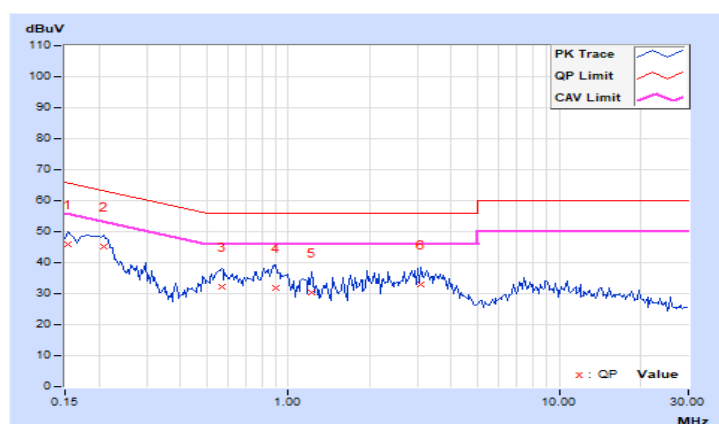


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	9.93	36.03	16.56	45.96	26.49	65.79	55.79	-19.83	-29.30
2	0.20859	9.94	35.11	19.68	45.05	29.62	63.26	53.26	-18.21	-23.64
3	0.56797	9.96	22.26	8.89	32.22	18.85	56.00	46.00	-23.78	-27.15
4	0.90391	9.98	21.87	10.07	31.85	20.05	56.00	46.00	-24.15	-25.95
5	1.21875	10.00	20.39	9.83	30.39	19.83	56.00	46.00	-25.61	-26.17
6	3.10156	10.08	22.96	15.51	33.04	25.59	56.00	46.00	-22.96	-20.41

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

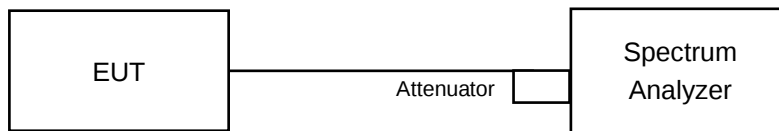


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

- a. Set resolution bandwidth (RBW) = 100kHz
- b. Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- c. Trace mode = max hold.
- d. Sweep = auto couple.
- e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

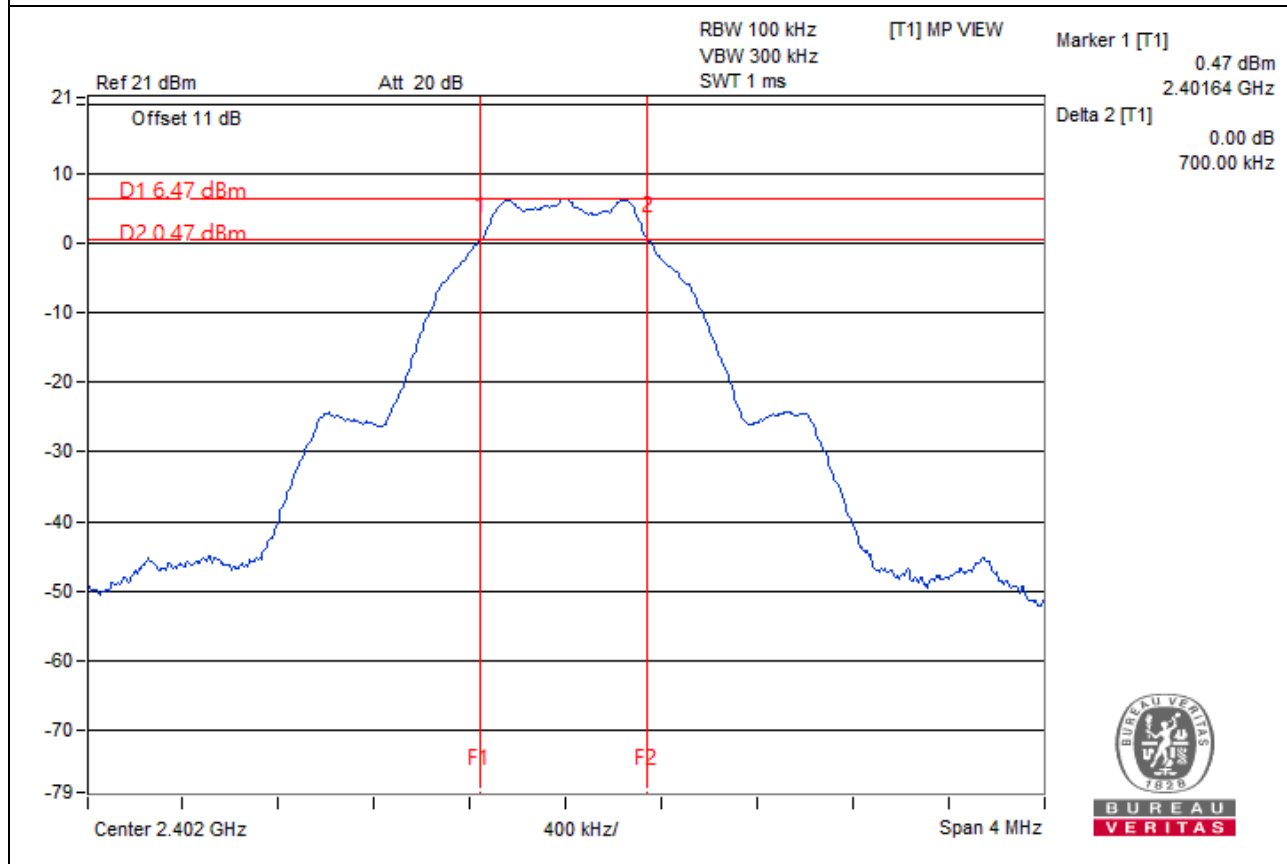
4.3.7 Test Results

BT_LE 1M

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	0.70	0.5	Pass
19	2440	0.70	0.5	Pass
39	2480	0.70	0.5	Pass

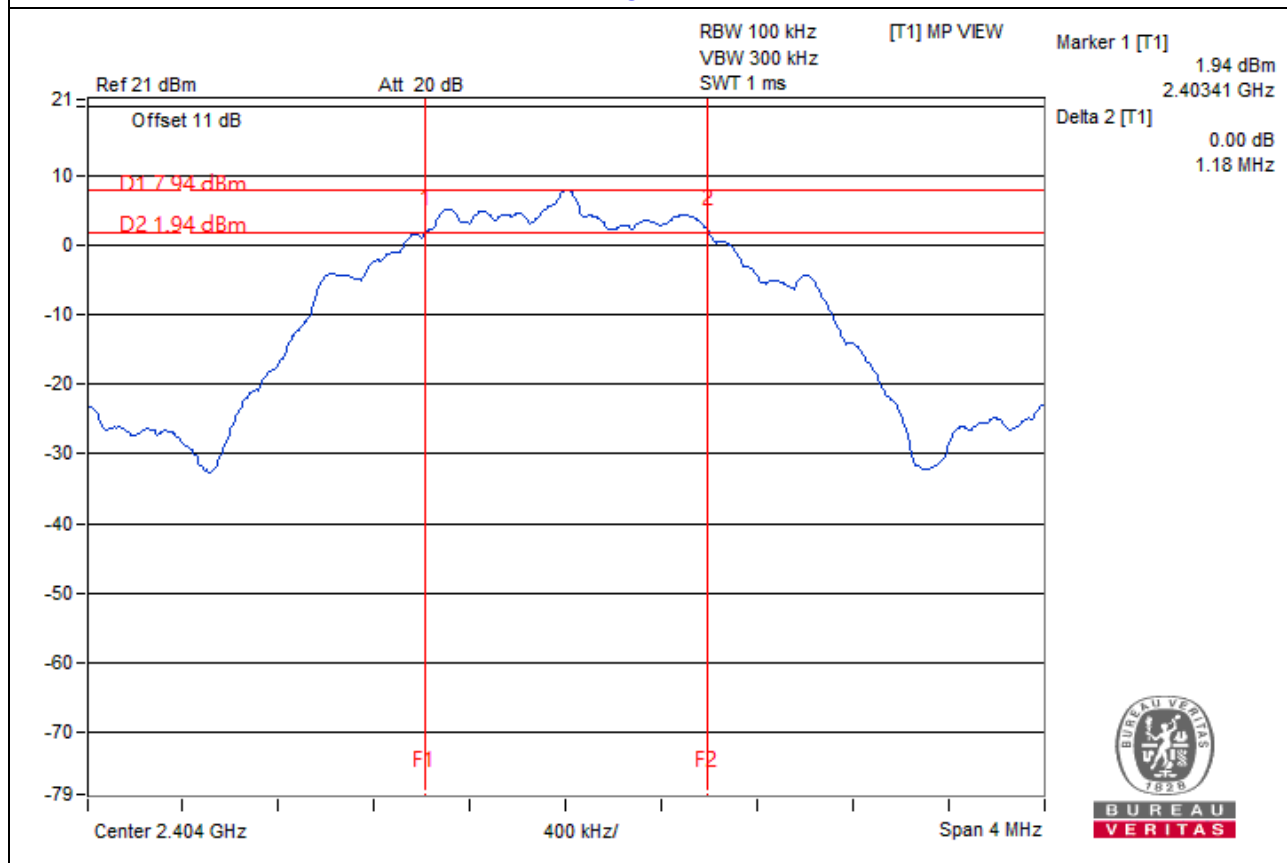
Spectrum Plot of Worst Value

CH 0



BT_LE 2M

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2404	1.18	0.5	Pass
19	2440	1.18	0.5	Pass
38	2478	1.18	0.5	Pass

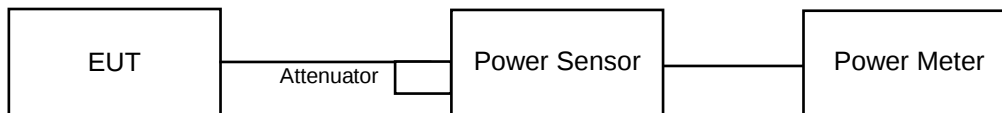
Spectrum Plot of Worst Value
CH 1


4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

BT_LE 1M

FOR PEAK POWER

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
0	2402	6.808	8.33	30	Pass
19	2440	6.546	8.16	30	Pass
39	2480	6.324	8.01	30	Pass

FOR AVERAGE POWER

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	6.531	8.15
19	2440	6.237	7.95
39	2480	6.067	7.83

BT_LE 2M

FOR PEAK POWER

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2404	7.311	8.64	30	Pass
19	2440	6.745	8.29	30	Pass
38	2478	6.471	8.11	30	Pass

FOR AVERAGE POWER

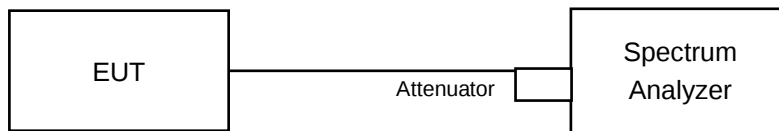
Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2404	6.966	8.43
19	2440	6.471	8.11
38	2478	6.266	7.97

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set the VBW $\geq 3 \times \text{RBW}$.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.

4.5.5 Deviation from Test Standard

No deviation.

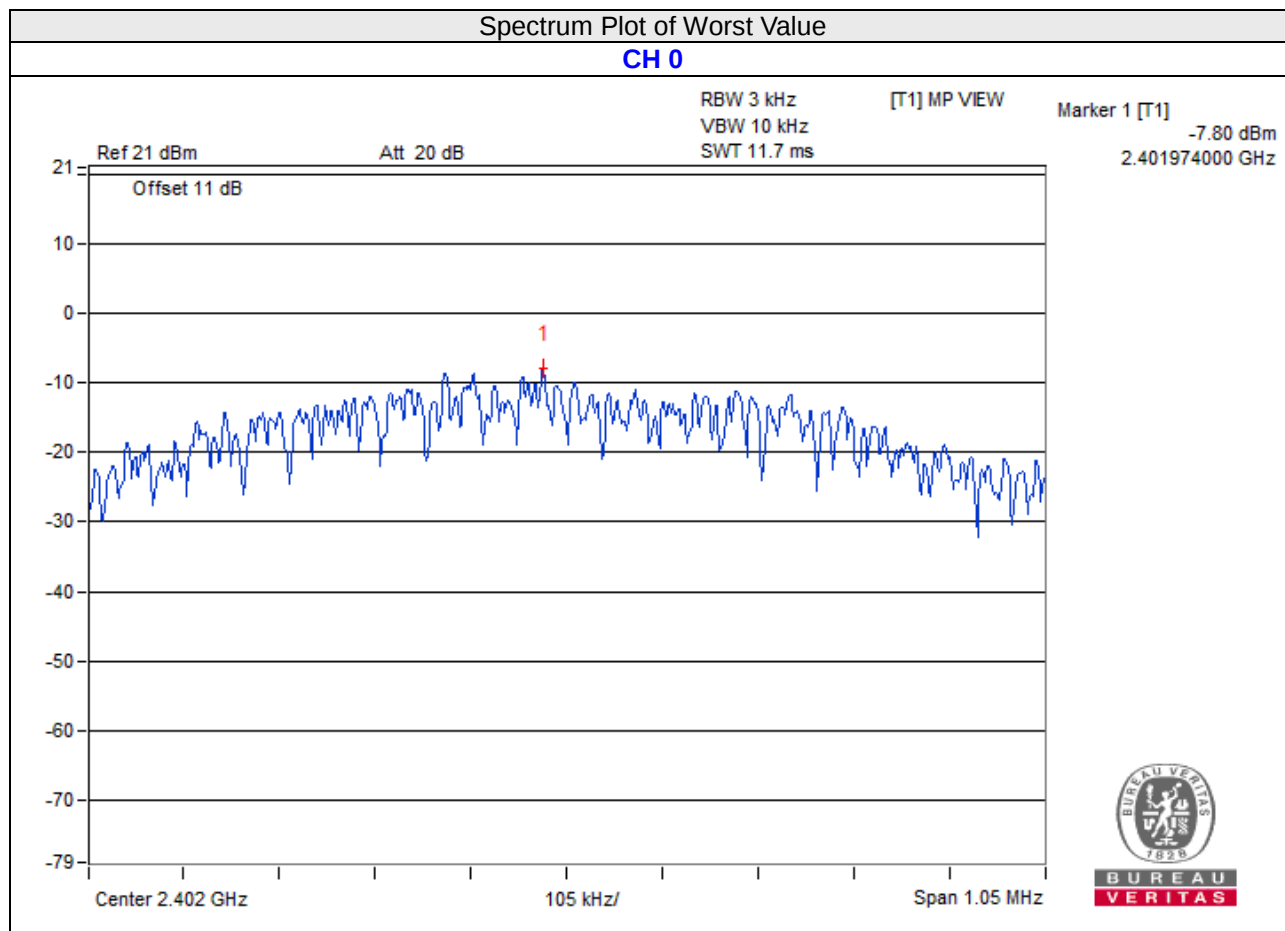
4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

BT_LE 1M

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	2402	-7.80	8	Pass
19	2440	-7.86	8	Pass
39	2480	-7.80	8	Pass

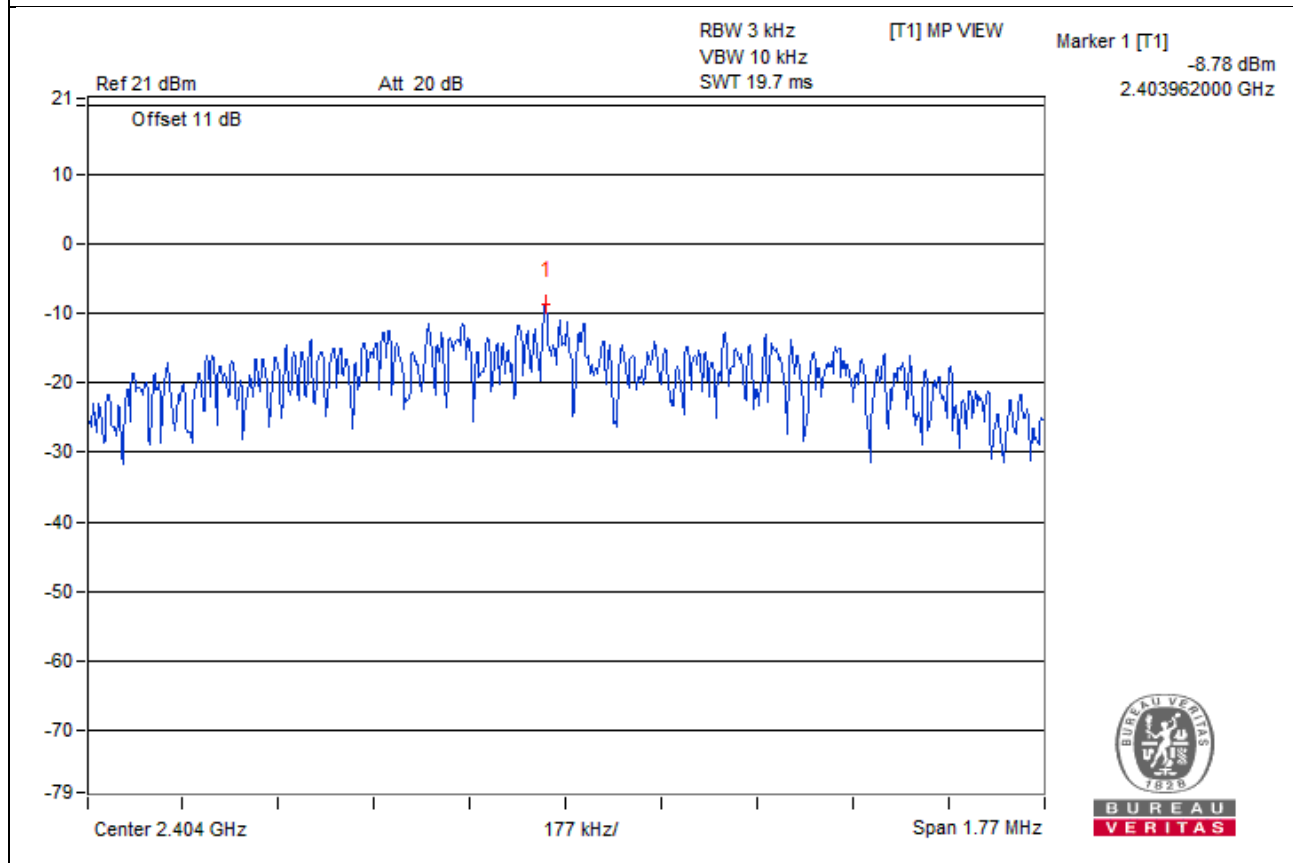


BT_LE 2M

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2404	-8.78	8	Pass
19	2440	-9.07	8	Pass
38	2478	-9.07	8	Pass

Spectrum Plot of Worst Value

CH 1

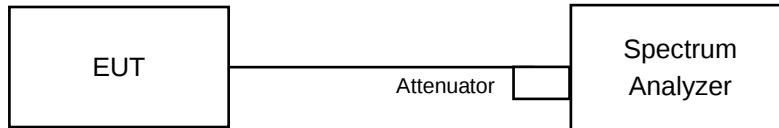


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

Below 20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

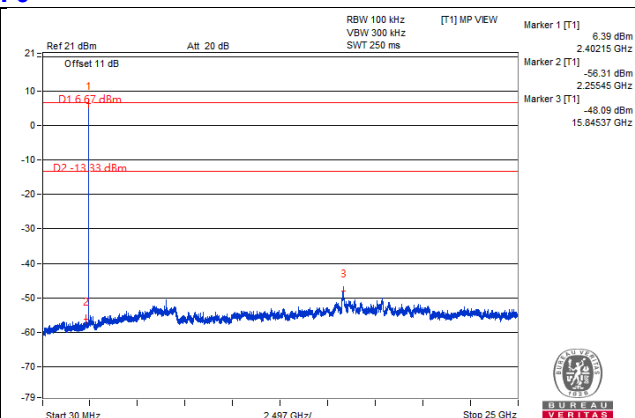
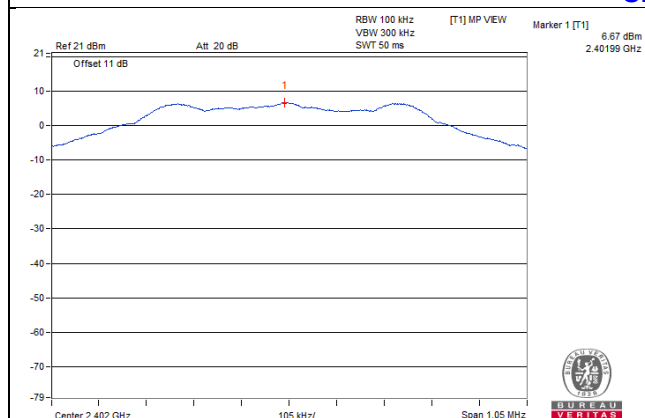
Same as Item 4.3.6

4.6.7 Test Results

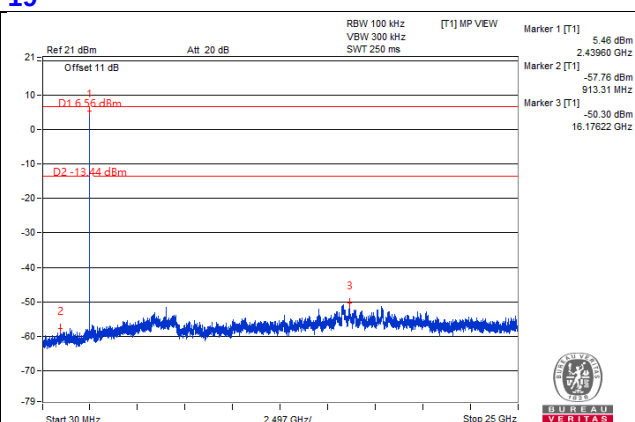
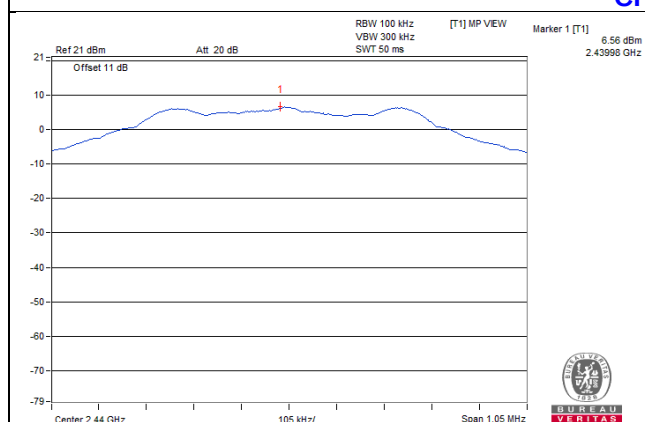
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

BT_LE 1M

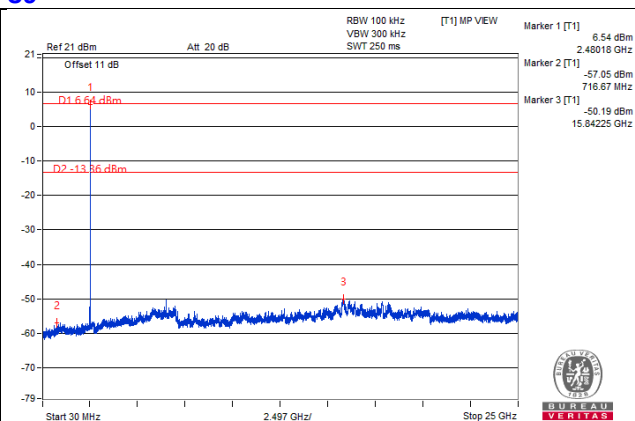
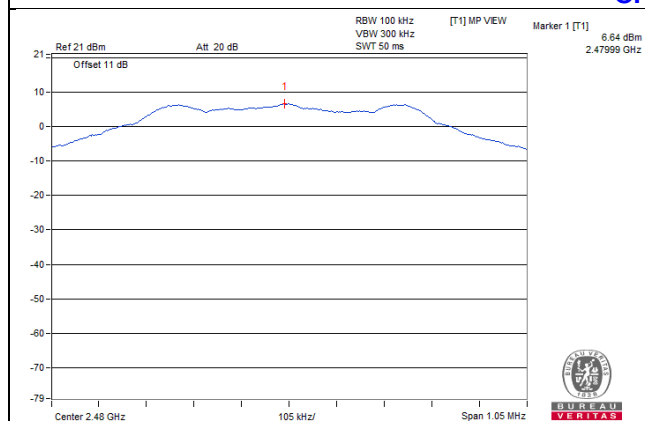
CH 0



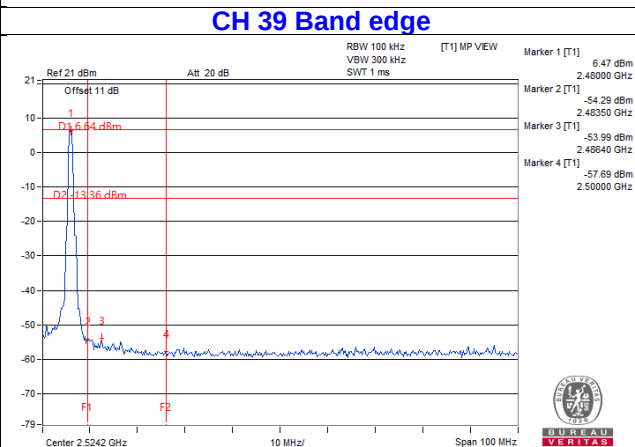
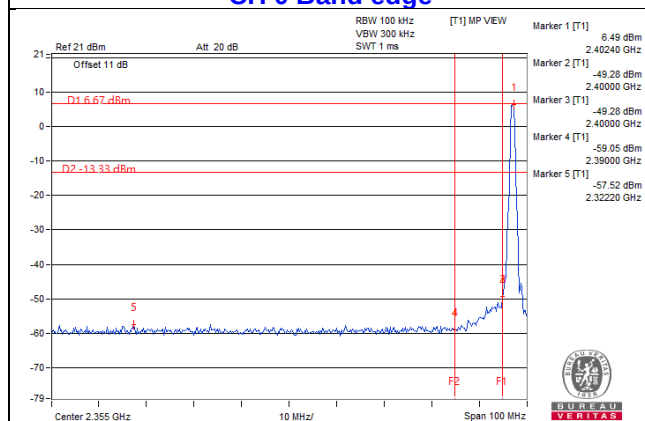
CH 19



CH 39



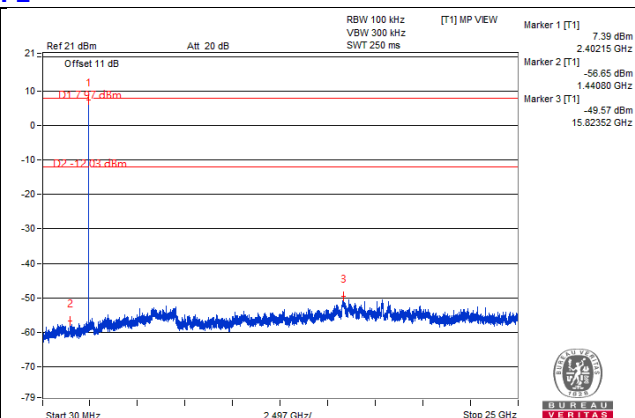
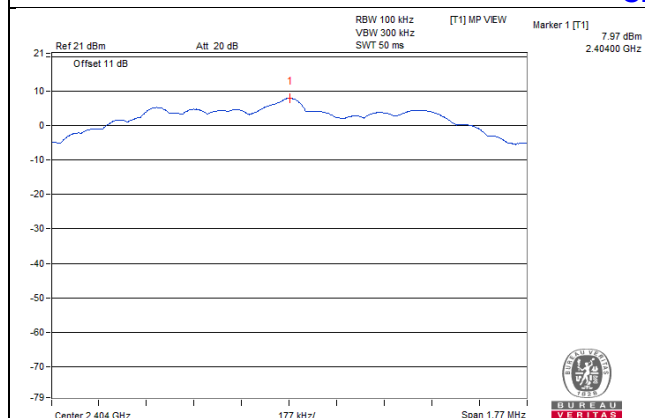
CH 0 Band edge



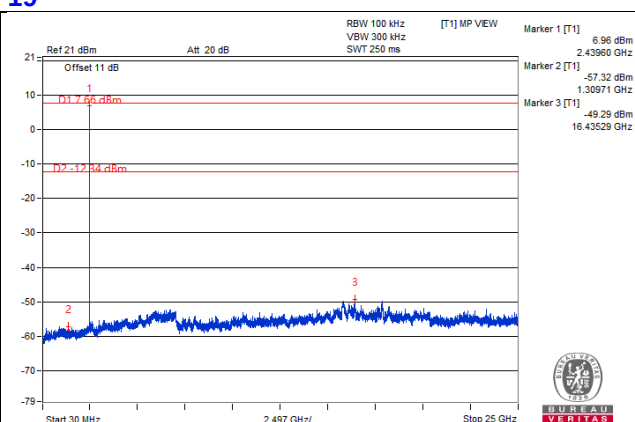
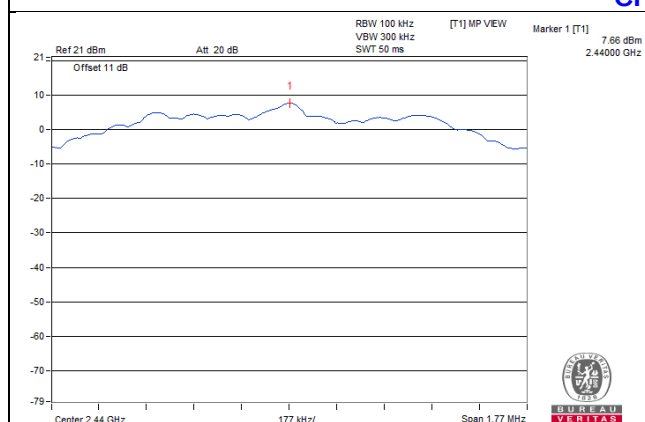
CH 39 Band edge

BT_LE 2M

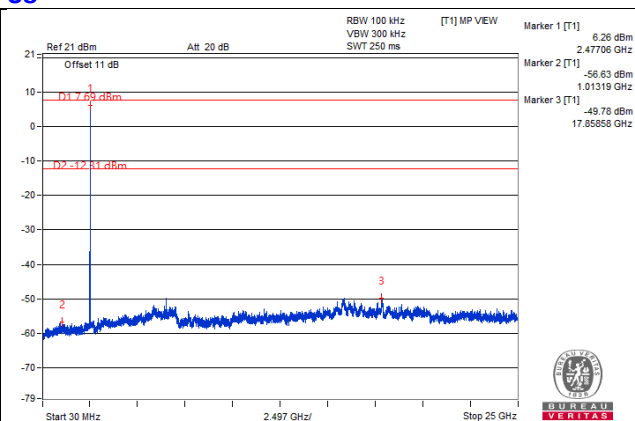
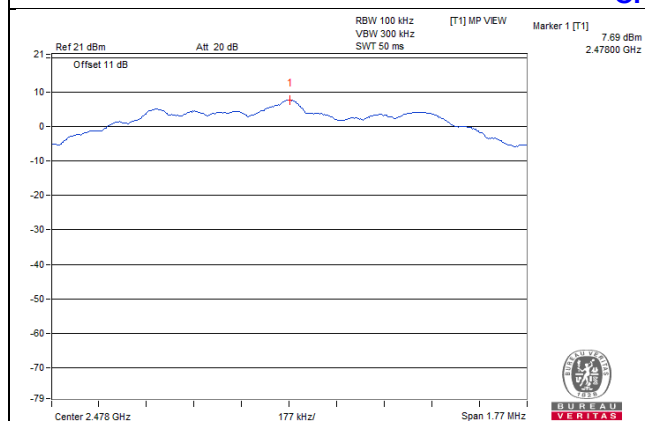
CH 1



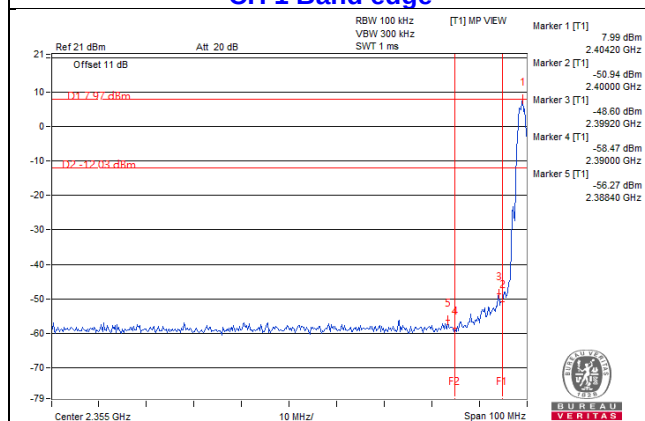
CH 19



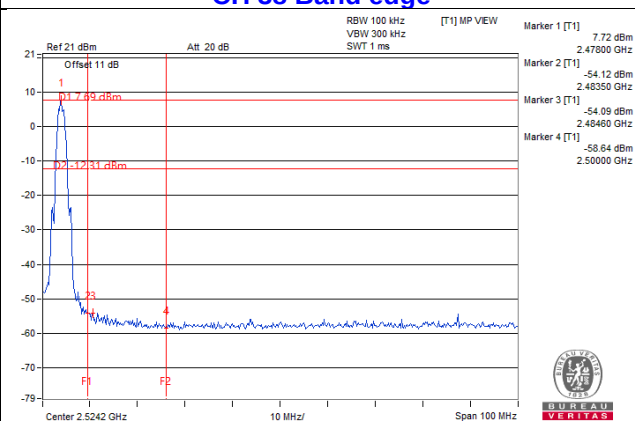
CH 38



CH 1 Band edge



CH 38 Band edge



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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